

Title

An Absorbent Article

Field of the Invention

- 5 The present invention concerns an absorbent article such as a towel, turban, capes or the like. In particular the invention relates to disposable absorbent articles.

Background to the Invention

- 10 Absorbent articles such as towels, capes, etc. are generally formed from woven cotton or the like, and are used in a large number of commercial applications such as in hairdressers, swimming pools, gyms, health spas, etc. Whilst such articles perform satisfactorily, there are a number of drawbacks when using same.

- 15 The most common method of drying articles or persons or drying or absorbing liquids and fluids involves the use of cloth and textile based materials. The articles, in particular towels and robes, are generally quite bulky, and consequently take up significant storage space. In addition, after each use, the article must be washed and dried, and possibly ironed, before it can be re-used.

- 20 Widespread use of reusable textiles for all types of applications means that the costs and environmental impact of constantly re-washing these is very high. Furthermore, depending on the particular use required, issues of hygiene and convenience also arise. In some situations a high level of time is also spent on separating the textile items into various different batches which must then be
25 washed separately. Examples of this would be in a hairdressing situation where the dye covered towels are washed separately or in a hospital where textiles must be separated depending on the level and type of contamination. This process is clearly time and labour intensive, and an improved alternative to such absorbent articles is therefore highly desirable.

- 30 In order to overcome these drawbacks, more recently light paper based products are often used in situations where the absorption required is small. However, these

products are not designed for second or prolonged use, as their level of absorbency and ability to remain together when wet is not high. These products are therefore used once, and disposed.

- 5 Some developments have taken place where by strands of plastic are woven into the paper products to provide extra strength. However these disposable towels are still not as soft to the touch, have limitations in absorbency and will lose strength after absorbing liquid. These disposable towels do not use the 100% viscose rayon.

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One material known to have the properties of absorbency and strength when wet is spun lace hydro entanglement rayon. It is known to use this material to provide products that absorb liquid and hold the liquid within the material. However all known products produced from this material are provided saturated with a liquid
15 i.e. in a wet state. Their purpose is to use the material to produce wet products.

In hair dye or other liquid lotion applications, for example head lice lotion applied to an individual, typically involves the use of conventional towels draped around a person in the form of a cape. However towels do not provide an effective neck
20 seal at front and back. Furthermore, towels are not effective at preventing colorant seeping through onto the clothes or person. In addition, as the towels are not disposable, colorant can damage or discolour the towels.

Additionally a significant amount of towels are required in the colouring
25 processing during hair dye applications. From the first washing of the hair, through to the protecting of the customers clothes, through to the final rinsing of the hair, a large quantity of individual towels are used. These towels can be damaged or bleached by the colorant/dye becoming patchy and unsightly. They can also require separate washing, thereby increasing the labour and costs
30 involved in running separate systems. Sometimes aprons or capes made from plastic type materials are used to drape over the customers shoulders and tie

around the stylist. These will stop the colorant from soaking through to the clothes of either person. However, as they have no absorbent properties, and the material is smooth it causes the excess colorant to form droplets, which can then run onto clothes or floor area. It is also known to use plastic caps placed over the head in hair dye applications. Prior art caps consists of people either using a normal towel for wrapping and tying up their hair, a textile based head turban or a plastic cap. Such caps are generally reusable and not disposable. They are also bulky and more awkward to attach. If a colorant is being used, it will also stain the textile material. This makes the textile material unsightly for future use.

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US Patent Publication No. US20030029872 entitled "Spill preventing paper holder for use during hair dye applications" attempts to overcome the problem associated with towels by providing a neck seal. A plastic spill prevention paper holder is described, which comprises a tray fitted around the neck. The tray is adapted to enable a sheet of paper to be placed into it in order to soak up any spillages. However, when compared to the cape made from the absorbent article of the present invention, it will be appreciated that a technique which requires the tray to be loaded with a sheet of paper results is a much more awkward, messy and ineffective technique. Other known capes used re made of plastic only. However while such capes prevent seepage, they do not absorb. The fact that there is no absorption can cause the dye or liquid to run off the plastic onto clothes or the floor.

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A problem with head lice lotion is the danger of cross contamination when towels are used to dry ones hair. Head lice treatments are insecticidal in nature, so it is preferable not to have these chemicals spreading onto other surfaces or people beyond what is intended. There is also the problem of the possibility of cross or continued infection carrying on from the first infestation.

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The present invention seeks to overcome the problems associated with existing absorbent articles.

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Summary of Invention

The present invention provides, as set out in the appended claims, a disposable absorbent article comprising a spun lace non-woven web and wherein the
5 absorbent article is substantially moisture free.

Preferably a liquid proof membrane layer is provided on one surface of the web. The liquid proof membrane layer may comprise of a plastic film layer or a layer of polyethylene film
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Preferably the content of the web comprises between 50 and 100% rayon and up to 30% polyester.

Ideally the web is formed by hydro entanglement.
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Suitably the web has a density of between 30 and 80 g/m².

Preferably the web is formed from hydrophilic fibres.

20 Ideally the web is impregnated with a dye retainer or the like. The dye retainer absorbs any dye in the web and prevents dye from penetrating through the disposable absorbent article.

Suitably the web is formed from a recyclable material.
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Preferably the absorbent article maybe one of the following: a towel, a turban, a glove, a cape, a cap, an apron or a mat.

Ideally the cape is adapted to fit around the neck of a user.
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Brief Description of the Drawings

The invention will be more clearly understood from the following description of an embodiment thereof, given by way of example only, with reference to the accompanying drawings, in which:-

- 5 Figure 1 illustrates one use of an absorbent article according to one aspect of the present invention.

Figure 2 illustrates a second use of an absorbent article according to another aspect of the present invention.

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Figure 3 illustrates a third use of an absorbent article according to a further aspect of the present invention.

- 15 Figure 4 illustrates fourth use of an absorbent article according to another aspect of the present invention.

Detailed Description of the Invention

- The present invention will now be described in detail. The present invention provides a novel application of a material, in particular the use of a spun lace non-woven web to produce absorbent articles such as towels, capes, etc., in order to produce products which have significant moisture absorbing capabilities, while being of significantly reduced weight and volume when compared with conventional woven cotton products or the like.
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- 25 The fibres chosen to produce the spun lace web will determine the characteristics of the finished fabric. The fabric will generally be a mixture of cellulose and synthetic fibres, such as nylon, acrylic, or polyethylene.

- In accordance with one embodiment of the invention, the web is made of between 30 50% and 100% rayon fibres spun into the web by means of hydro entanglement. The process of making viscose rayon involves several steps. Firstly, the cellulose

pulp is steeped by immersing it in liquid sodium hydroxide at a temperature of 18c to 25c. This process swells the cellulose fibres and converts the cellulose to alkali cellulose.

- 5 The swollen alkali cellulose mass is then pressed to a wet equivalent of approximately 3 times the original pulp weight, so as to obtain an accurate ratio of alkali to cellulose.

10 Next, the pressed alkali cellulose is shredded mechanically to give finely divided particles. This step provides an increased surface area of alkali cellulose, and results in an increase in its ability to react during the next steps of the process.

15 After pressing, the alkali cellulose is aged under controlled conditions of time and temperature, in order to depolymerise the cellulose. During this stage of the process the average weight of each molecule of pulp will be reduced, the object being to provide a viscose solution with the ratio of viscosity and cellulose concentrate.

20 The aged alkali cellulose pieces, called "crumbs", are then placed in storage containers and allowed to react with carbon disulphide to form cellulose xanthate. The crumb is dissolved in a liquid caustic solution. The large xanthate particles attached to the cellulose force the fibres apart, reducing the strength of the group of fibres thereby allowing water molecules to separate the chains, leading to solution of an other wise insoluble cellulose.

25 The viscose is then allowed to ripen for a period of time. During ripening two important processes occur, namely redistribution, and the loss of the xanthate groups. The reversible xanthation reaction allows some of the xanthate groups to revert to cellulosic hydroxyls and free CS₂. This free CS₂ can then escape or react
30 with other hydroxyl on the other portions of the cellulose chain. The crystalline structure is thus gradually broken down and a more complete solution is achieved.

The solubility of the cellulose is reduced, and this facilitates the regeneration of the cellulose after it is formed into a filament.

5 In order to remove undissolved materials, the viscose is then filtered. If it were not filtered at this stage, the undissolved materials would disrupt the spinning process. This could cause possible defects in the rayon filament.

10 The next step of the process is the removal of bubbles of air trapped in the viscose by degassing. These air bubbles would cause weakness in the fine filaments if they were not removed.

15 The viscose solution is then fed into a spin bath containing sulphuric acid, sodium sulphate and zinc sulphate. This results in the rapid coagulation of the rayon filament. This is followed by simultaneous stretching and decomposition of cellulose xanthate to regenerated cellulose.

20 The rayon filaments are then stretched while the cellulose chains are still relatively supple. This causes the chains to stretch out and orient along the axis of the fibre.

The freshly regenerated rayon contains many impurities which need to be removed. There exist a number of different washing techniques which may be used to remove these.

25 Finally, a group of filaments is passed through a cutter to provide a fibre which is then ready for processing.

30 Once the fibre web is formed, it is consolidated. This is achieved by mechanical bonding the web by the method of hydro entanglement. This entangles the fibres to give strength to the web.

The process of hydroentanglement of the web utilises jets of water at high speed, directed against a web of fibres, such that the fibres are tangled or knotted about one another. This involves a number of sequential steps, namely the initial formation of a precursor web, the subsequent entanglement of the web, the circulation of water out of the web, and finally the drying of the web. The precursor web may be an air laid or carded web (a "dry laid" web), or may alternatively be a wet laid web. The precursor web is generally first wetted and compacted in order to reduce or eliminate any air pockets which may be contained therein.

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Once the precursor web has been so pretreated, it is then exposed to an array of water jets, whose pressure will normally increase from the leading to the trailing edge of the array of water jets. The action of the water jets striking the web forces the fibres to become entangled. The precursor web will normally be drawn over a conveying roller, which is generally wire or mesh like in form, and across which a negative pressure is applied in order to draw the used water from the web, in order to prevent flooding of the web, which would reduce the entanglement effect of the water jets thereon.

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The fabric or web will normally be passed over a second conveying roller, exposing the reverse side of the fabric, in order to effect entanglement of same. These steps may be repeated a number of times until the desired level of entanglement has been achieved. The web can be impregnated with a dye retainer or the like. The dye retainer absorbs any dye absorbed by the web and prevents dye from penetrating through the disposable absorbent article.

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The entangled web is then de-watered by passing through a suitable de-watering device, following which the fabric is dried.

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The above produced spun lace fabric has a number of beneficial properties which make it suitable for use to produce absorbent articles. Its properties include high

strength and conformability. In particular, spun lace produced fabrics possess the property of substantial water absorption.

5 The spun lace fibre also has the added advantage of being soft and comfortable to the skin. In addition, such fibres easily absorb dye and drape easily and naturally. Furthermore, these fibres provide an even and uniform distribution of additives throughout the whole of the fibre structure, when compared to other materials, which would only allow the additives onto the surface. This material also has the added benefit of being recyclable and bio-degradable.

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For the application of spun lace webs to the manufacture of absorbent articles, use of hydrophilic fibres is greatly preferred, obviously due to their water retention capabilities. However, it has also surprisingly been found that hydrophilic fibres entangle more easily than hydrophobic fibres, due to the higher drag forces
15 therebetween. It has however been found that the greater the hydroentanglement energy used, and therefore the greater the entanglement of the fibres forming the web, the lesser the absorbent capacity of the web.

20 The dried fabric manufactured using the above described process may be cut to any desired shape to form a particular absorbent articles. It will be appreciated that any type of article may be made which would benefit from the properties of the absorbent material. A number of embodiments of absorbent articles in accordance with the present invention are now described.

25 One article which may be made using the above described spun lace material is a disposable towel, as illustrated in Figure 1 used for drying hair. The towel is made of between 50 and 100% viscose rayon material and is made by means of the above described spun lace hydro entanglement. This will give the towels all the properties of both the material used, and the method used in its production, as
30 mentioned above, namely high absorbency, strength, softness and natural drapability. The use of 100% viscose rayon specification will give the highest

absorption while maintaining strength. It has been found that using viscose rayon of below 50% is not suitable to provide sufficient absorption. The towel can be cut to any desired size and folded in any means suitable for its end use or packaging requirements.

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Another article which may be made using the above described spun lace material is a head wrap/turban as illustrated in Figure 2. A towel may also be used as a modified turban. Such a head wrap/turban may be used for example after washing hair and/or colouring hair.

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The turban can be made from 100% viscose rayon material made by means of spun lace hydro entanglement for maximum absorption. The turban is designed, cut and shaped to fit a person's head, as illustrated in Figure 2. The hair is held up by means of attachment at either the front or the back. The wrap has an elasticated bottom rim to allow a seal (not shown) be created around the hairline. This product enables hair to be tied up comfortably and safely, while at the same time acting to absorb any liquid still contained within the hair.

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It will be appreciated that this head wrap made of this absorbent material provides a number of advantages over existing head wraps. Typical head wraps are in the form of textile based head turban, or involve people using a normal towel and wrapping it up. In contrast to the head wrap made of the absorbent material of the present invention, these prior art turbans are not disposable, and are also more bulky and awkward to attach. Furthermore, if a colorant is being used on the head prior to the fitting of the head wrap, it will also stain the textile material making it unsightly for future use.

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Due to its disposability, the head wrap of Figure 2 made of the absorbent material of the present invention also has applications in situations where something has been in contact with the hair, which it is not desirable to have passed on, for example, head lice chemical treatment. These head wraps can be used effectively

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and safely, and then be disposed of. This therefore does away with any potential for cross contamination.

Another article incorporating the material of the present invention is a cap. The
5 cap can be designed, cut and shaped to fit all head sizes. It allows hair to be wrapped up into it and held up by means of an elastic rim along the base of the cap that will create a seal along the hairline.

Such a cap is suitable for example for washing hair and/or colouring hair. It
10 allows the hair to be tied up comfortably and safely while at the same time acting to absorb any liquid still contained within the hair.

Furthermore, due to its disposability, the cap will also have applications in situations where something has been in contact with the hair, which it is not
15 desirable to have passed on for example, head lice chemical treatment. In this case, the cap can be used effectively and safely, and then be disposed of, thereby doing away with any potential for cross contamination.

In one embodiment of the absorbent articles of the present invention, the property
20 that spun lace materials can be impregnated with various chemicals or coated in a variety of ways is made use of in the design of the absorbent articles. In accordance with this embodiment, a thin film of plastic type material is coated on one surface of the spun lace fibre material, so as to form a liquid proof membrane on one side, while maintaining absorbency on the other. In essence, such an
25 absorbent article is made of two layers of material. One side of such an absorbent article is made of spun lace rayon. This side is therefore highly absorbent, soft to the touch and strong when wet. The other side of the absorbent article is provided a layer of PE (polyethylene) film, heat sealed onto the rayon layer. This layer will act as a liquid resistant layer preventing liquid, especially colorant/dye from
30 penetrating through the material.

One such absorbent article which may be coated in this way is a dye resistant shoulder cape, as illustrated in Figure 3. The cape is draped over the shoulders of a person or individual. The absorbent material of the cape is provided on one side with a layer of PE film, forming a liquid resistant layer. The shoulder cape is
5 designed and shaped to fit neatly and comfortably around the neck, and drape naturally over the shoulders, providing the best level of protection from liquid, such as dripping colorant, as illustrated in Figure 3.

In the preferred embodiment of the shoulder cape, the neck cut out of the cape is
10 set back into the body of the cape with the ability to pull the front sides of the cape tighter to the neck, in order to create a good seal. A double sided pull off sticking device is attached to one side of the cape neck seal (not shown). The sticking device can be moved in or out, in order to provide an adjustable means of fitting the cape comfortably to an individual neck.

15 The production of the cape from the absorbent article of the present invention results in a highly effective means of trapping liquid as it drips from hair when compared to prior art techniques. The cape made from the absorbent material of the present invention will absorb the liquid into the spun lace layer, thus
20 preventing it from soaking through onto the clothes or body of the person, while the plastic coating prevents the liquid from penetrating right through the article.

Another application which is suitable for incorporating the absorbent material of the present invention is a dye resistant placement mat. As is the case with the
25 shoulder cape, it comprises two layers of material. One side will consist of 100% spun lace rayon. This side will be highly absorbent, soft to the touch, and strong when wet. The other side will consist of a layer of PE (polyethylene) film heat sealed onto the rayon layer. This layer will act as a liquid resistant layer preventing liquid, especially colorant/dye from penetrating through.

The mat can be of any size or shape depending on the end usage. The absorbent side is adapted to be placed face up, while the resistant side is adapted to be placed face down onto the surface. This allows colorant bottles, gloves, combs and any other implement contaminated with colorant or other liquid to be placed
5 onto the mat. This mat incorporating the absorbent material of the present invention has numerous benefits when compared to prior art products. The mat is illustrated in Figure 3 with the bottle placed on top.

The mat prevents liquid from seeping through onto the work surface thereby
10 avoiding any damage or discoloration to work surfaces of a particular area. Furthermore, the mat can simply be disposed of when it is no longer required, leaving the work surface/area clean and damage free.

Another product incorporating the material of the present invention is an apron
15 (not shown). As was the case with the shoulder cape and the dye resistant mat, the apron is made of two layers of material, with one side consisting of spun lace rayon providing a highly absorbent, soft to the touch and strong when wet material, and with the other side consisting of a layer of PE film, heat sealed onto the rayon layer, which acts as a liquid resistant layer.

20 The apron is designed with a neck strap for hanging around the head and straps for fastening around the waist of a user. The dye / liquid absorbing layer will be on the outside, in order to catch the liquids, while the resistant layer will be on the inside to protect the clothes of the person.

25 The apron incorporating the absorbent material of the present invention is highly absorbent, strong, soft to the touch, comfortable to wear, disposable and biodegradable. Consequently, it is highly effective at trapping colorant/dye/liquid as it drips from hair, absorbing the liquid into the spun lace layer, while
30 preventing it from soaking through onto the clothes or body of the stylist. The apron can be disposed of at the end of a working day or after a single use.

Another application incorporating the material of the present invention is a mitt or glove. As in the case of a number of the previously described applications, the mitt using the absorbent material of the present invention is made up of two layers of material. One side will consist of spun lace rayon, to provide a side which is highly absorbent, soft to the touch, and strong when wet. The other side will consist of a layer of PE film heat sealed onto the rayon layer. This layer will act as a liquid resistant layer preventing liquid, especially colorant/dye from penetrating through.

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The mitt of the present invention is provided with the resistant layer on the inside to protect the hands of the person applying the process. The outer layer of the mitt is absorbent. This absorbent layer will soak up the item being applied, for example tanning cream, sometimes called 'fake' tan. In addition, it also allows the applier to distribute the substance evenly and cleanly to the surface without getting their hands covered in the substance.

Alternatively, the mitt can be inverted for different applications so that the soft side is touching the hand and the resistant side is placed on the outside, blocking seepage through to the hand but also not absorbing the material being applied. This would be appropriate when applying an expensive lotion where it is not desired to waste by absorbing it into the material.

The mitt of the absorbent material of the present invention provides a number of advantages when compared to prior art mitts. Typically, ordinary latex, plastic, or vinyl gloves would be used to apply the dye or tanning lotions. The feel and touch of plastic/latex gloves on the skin is not very pleasant and the lotion can be wasted by getting trapped in between the fingers. In contrast, the resistant mitt ensures less wastage of lotion, nicer touch on skin and no more dyed or tanned palms of the person applying the lotions.

Thus the use of hydroentangled webs for producing absorbent articles results in a product which is extremely compact and light weight, yet highly absorbent, and which has significant strength and pliability.

- 5 In addition, if such products are to be used for producing, for example, capes and aprons, the fabric may be impregnated with a dye retainer or the like. The properties of this spun lace material enable a thin film of plastic type material to be coated on one surface of the spun lace fibre material, so as to form a liquid proof membrane on one side, while maintaining absorbency on the other.

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- Once an article formed from such hydroentangled fabric has been used once, it can simply be discarded, thereby avoiding the need for the cost and time consuming process of laundering the products, for re-use. As a result of the fibres used to form the hydro entangled webs, the articles may be recycled, thereby
15 avoiding the production of waste. Finally, the articles can be reproduced relatively cheaply.

- As described above, the absorbent material of the present invention can be used to provide a number of articles. It will be appreciated that a number of these articles
20 could be provided together in a convenience pack suitable for use in a particular application.

- For example, one pack could comprise a disposable kit used in the process of colouring hair in a non-professional setting. This pack is not a means of actually
25 colouring the hair, but rather a means of controlling the environment in which the process is done and, upon completion, allowing for the items to be disposed of safely and hygienically.

- The contents of the kit or pack may comprise a towel, dye resistant shoulder cape,
30 dye resistant mat and a head wrap, all made from the absorbent material. The towel or a number of towels would be suitable for use both after the initial wash,

and after washing the excess colorant from the hair. The dye resistant cape protects the person and their clothes from the dye. The placement mat allows all the components of the process to be placed onto an area, thereby capturing any excess dye. The head wrap allows the coloured hair to be tied up safely while
5 allowing the person to move around freely until the colorant sets into the hair. The pack or kit makes the process of home colouring of hair easier and more accessible.

Another disposable pack could consist of a disposable pack or kit used when
10 colouring hair in a professional situation like a hair salon. This pack is not a means of actually colouring the hair but rather a means of controlling the environment in which the process is done and upon completion allowing for the items to be disposed of safely and hygienically. This type of pack may contain towels, a dye resistant shoulder cape, a dye resistant placement mat, a cap and an
15 apron.

The purpose of the pack is to allow a hair stylist to have a single kit available when colouring hair. This single pack gives a complete set of disposable, protective and absorbent items minimising the mess and follow up cleaning
20 associated with colouring hair. These items used together will effectively protect both the customer and the stylist from the colorant and will contain the colorant within the area of the process. These items can then be simply disposed of.

The set of items in the pack allows a normally messy process to be managed in an
25 easy, hygienic and convenient manner, protecting both parties involved and containing effectively any possible spread of the colorant beyond the specific area of operation.

Another pack of the present invention is suitable for treating hair/head lice. This
30 pack is not a means of treating the actual condition but again provides a means of controlling the environment in which the treatment is conducted. These items are

completely disposable thereby allowing all the items used in the treatment to be disposed of safely and hygienically. This also ensures that there is no chance of cross or continued infection carrying on from the first infestation.

- 5 This pack may contain towels, shoulder cape, cap and placement mat. The towels are used instead of normal household towels, thus keeping the infestation away from the normal laundry. The shoulder cape acts as a barrier protecting the users clothes and the area around them. After the treatment has been shampooed into the hair, it must be allowed time to work. During this time the elasticated cap is
10 placed on the head to prevent dripping and to absorb any of the insecticide liquid. The placement mat allows an area for the items used in the process to be safely placed upon.

- This pack allows the head lice treatment process to be controlled and contained
15 within a set area using a designed set of tools to make this possible. The complete application can now be carried out safely and hygienically. When complete, the whole pack or kit can be disposed of preventing any further concerns about cross contamination.

- 20 Another kit could comprise disposable towel items used when applying self tanning lotion or tanning cream to the body. It will be appreciated that the above described articles and kits serve as examples only for articles and kits, which could be made of the absorbent material of the present invention.

- 25 The words "comprises/comprising" and the words "having/including" when used herein with reference to the present invention are used to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

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The present invention is not limited to the embodiments described herein, which may be amended or modified without departing from the scope of the present invention.